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Trends in acquisition and usage of electronic resources at Indian Institutes of Technology libraries

Daulat Jotwani
Librarian, Indian Institute of Technology Bombay, Powai, Mumbai 400 076, India, Email: jotwanid@iitb.ac.in

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The paper studies the trends in acquisition of e-resources vis-a-vis their print counterparts, identifies the e-resources being subscribed by Indian Institute of Technology (IITs) libraries at Kharagpur, Bombay, Madras, Delhi, Kanpur, Guwahati and Roorkee either individually or through a consortium, and analyzes the usage of these resources during 2004-11. The study also compiles a union list of all e-resources accessible at IIT Libraries. Data were collected by personal visits, interviews, and using a questionnaire. Web sites and annual reports of the Ministry of Human Resource Development, IITs and INDEST-AICTE Consortium were also scanned to supplement the above information. COUNTER compliant data as provided by the publishers were used to study the usage. Data analysis revealed that IIT libraries spend a significantly large proportion of their budgets to acquire e-resources. There is a clear shift in the collection development policies of these libraries where e-resources have become a vital part of their core collections. E-resources in all IITs are being heavily used as the number of downloads have increased from 32,33,818 to 76,17,691 articles reflecting a growth of 135% over a period of 8 years.

Keywords: IIT Libraries; E-resources; Usage statistics

Introduction

Electronic resources are documents in electronic form or that can be accessed via electronic transmission and include books, journals, newspapers, magazines, archives, theses, conference papers, examination papers, government papers, research reports, scripts and monographs. These resources have become critical part of the learning environment, particularly in the higher education, and bring tremendous benefits to organizations and individuals to perform their work more effectively and efficiently. The benefits of e-resources have been well documented[1].

Numerous studies conducted mainly in academic environment focused on people's perceptions and preferences for electronic resources have found their rapidly growing acceptance within the scholarly community[2-14]. Commonly cited reasons included links to additional resources, ease of searching and searching capability, currency, availability, and ease of access and printing[3].

Access to electronic resources has not only influenced the way students and scholars conduct research, it has also changed the way they use the traditional library. This has forced libraries to reorient their collection development policies and swiftly move towards e-resources resulting in a growing collection of electronic resources with corresponding increase in libraries' acquisition budget on electronic resources[4,5,6].

In India too, electronic resources and services have become the popular tools for research and academic activities[7] and there is an increasing preference for the electronic format as these sources provide faster and reliable information[9]. The shift from print to electronic collections has had an impact on library functioning with increasing number of libraries spending a substantially larger portion of their budget for acquiring a variety of e-resources for their users. Haridasan and Khan in a study of social scientists found that large numbers of research scholars and faculty members at NASSDOC, India are using the e-resources for their research work[10]. Madhusudhan reports that electronic resources have become an integral part of the information needs of research scholars at Kurukshetra University[11]. Ali and Nisha in a study found that that more than 60% of users in the Central Science Library of Delhi University are using e-journals for their research work[10]. According to Kaur, access to e-journals has accelerated research activities in all disciplines of study as the authorities are also supporting provision of access to e-journals either by joining consortia or subscribing directly from the publishers[13]. Sasireka *et.al*. studied the

availability of digital resources in self financing engineering institutions in Tamil Nadu and found that online journals/e-journals are most preferred digital resources[14].

E-resources in IIT Libraries

IITs known for their "culture of excellence" impart world-class training in engineering and technology, and conduct research in the relevant fields for advancement of learning and dissemination of knowledge. These Institutes offer undergraduate, postgraduate and Ph.D. programmes in various branches of engineering, technology and interdisciplinary areas. Each of the IITs has a large, well maintained, fully automated Central Library supporting teaching, learning, scholarship and outreach programmes of the institutes[15]. These libraries have been using web based e-resources since late 1990s' and their collection of e-resources has not only been steadily increasing but also being accessed by an increasing number of users. In addition to the e-resources being acquired from their own funds, IITs get access to over 12000 e-journals and databases through INDEST-AICTE Consortium[16,17].

Objectives of the study

- To study the trends in acquisition of e-resources vis-a-vis their print counterparts;
- To identify the e-resources being subscribed to by IIT libraries either from their own budgets or through INDEST-AICTE Consortium and compile a union list of all e-resources currently accessible at IIT libraries; and
- To analyze the usage of these resources during 2004-11.

Methodology

The study covers 7 IIT Libraries at Kharagpur, Bombay, Madras, Delhi, Kanpur, Guwahati and Roorkee. The data related to trends in acquisition of e-resources vis-a-vis their print counterparts, the amount being spent for this purpose, and the e-resources being subscribed to by IIT libraries were collected during personal visits, interviews, and using a questionnaire. Web sites and annual reports of the Ministry of Human Resource Development, IITs and INDEST-AICTE Consortium were also scanned to supplement the above information.

The usage data/reports as provided by the publishers/database producers were analyzed to understand the usage. The usage reports are a direct and immediately available record of what users have done, and are being used by increasing number of libraries to make subscription decisions (renewing, cancelling, or upgrading subscription to e-resources), to justify expenditure on their electronic resources, and to alert the recommending department regarding less usage of the database[18-21].

Most of the publishers/database producers provide the COUNTER (Counting Online Usage of Networked Electronic Resources, 2012 – Code of practice for e-resources, 4th release)[21] compliant usage statistics in respect of the e-resources on their website which can be directly accessed by the libraries through an interface. However, publishers can also supply the usage reports periodically to the libraries upon request. For the purpose of this study, the usage data in respect of the following e-resources for the period from 2004 to 2011 (8 years) have been analyzed[22]:

1. ABI Inform
2. ACM Digital Library
3. APS/AIP Journals
4. ASCE Journals
5. Ebsco Database
6. Emerald
7. IEEE Xplore Digital Library
8. Nature Publishing Group (NPG) Journals
9. Science Direct
10. Springer Link
11. MathSciNet
12. SciFinder Scholar
13. Scopus
14. Web of Science

The above e-resources were selected because they form a major part of core collection and include resources from publishers like Elsevier Science, Spring Verlag, Nature Publishing Group, IEEE, Thomson Reuters, ASCE, AMS, etc. These include 10 full text databases and 4 bibliographic databases (S. No. 11-14) covering many important e-resources in terms of subject coverage and relevance to IITs, and the number of journals covered. Further, all of them are accessible to all 7 IITs except ABI Inform, Ebsco database and Emerald which are not accessible to IIT Guwahati as it does not have a Department/School of Business Management and their usage data are available in the public domain and could be easily accessed and analyzed.

Analysis

Trends in acquisition of e-resources in IIT Libraries

Analysis of the data collected for this study revealed the following:

- In IIT Bombay, the print-only subscriptions have decreased from 923 in 2001 to 425 in 2012, while electronic-only journals have increased from 1 in 2001 to 840 in 2012. Print-and-online subscriptions also decreased from 224 to 25 during the same period.
- IIT Delhi library which was subscribing to 201 print-only and 501 print-and-online titles in 2006-07, has reduced their print-only titles to 120 and stopped all print-and-online titles. The number of online-only titles which was 5 plus 3 packages in 2006-07, has increased to 597 titles plus 21 packages in 2011-12.
- IIT Kharagpur library's print-only subscriptions have decreased from 1080 in 2006 to 217 in 2012, while online-only subscription have increased from 09 to 649 during the same period.
- Online-only subscription in IIT Madras have gone upto 696 in 2012 from 336 in 2010, while print subscriptions have come down to 128 from 630 during the same period.
- In IIT Roorkee, there has been a decrease in print-only (from 367 to 264) and print-and-online subscriptions (from 492 to 405), while there is significant increase in online-only subscriptions from 34 to 146 during 2006 to 2012.
- There is no change in print and print-and-online subscriptions in IIT Guwahati during 2010-12 but the number of online-only subscriptions has increased from 251 to 363 during the same period.

It is evident from the above that there is a clear shift in subscription pattern from print-only/print-and-online to online-only subscriptions in IIT Bombay, Delhi, Kharagpur and Madras. The change is comparatively slow in IIT Roorkee and IIT Guwahati. The study also revealed that IIT libraries at Bombay, Delhi, Madras, Kharagpur and Roorkee spend more than 2/3rd of their budget to subscribe to e-journals and databases and the resources have become integral part of their core collection.

Union list of e-resources

The study found that the IIT libraries have access to 131 databases/packages/collections covering about 15,000 e-journals, e-books and databases in most of the relevant subjects in engineering, sciences, and technology from all important publishers, societies and associations. It also includes 19 databases being subscribed to by the INDEST-AICTE Consortium (supported by the Ministry of Human Resource Development, Government of India) for all IITs. A union list of all e-resources compiled from the above data has been appended to this paper (Annexure – I).

Usage of e-resources in IIT Libraries

The usage of all 14 e-resources selected for this study at the 7 IITs during 2004-11 have been presented in Table 1.

Table 1 shows that the downloads have increased from 32,33,818 in 2004 to 76,17,691 in 2011 reflecting an increase of 135% over a period of 8 years which is adequate enough to justify the spending of a large proportion of their funds to procure e-resources. IIT Bombay has been recording consistent increase in the usage of e-resources from 2004 to 2011 with the exception of 2006 when the usage declined marginally.

IIT Delhi which is the head quarter of INDEST-AICTE Consortium recorded highest usage of e-resources in the first year (2004) itself. However, the usage has been fluctuating subsequently. The usage at IIT Delhi increased during 2004-2006, 2008-2009, and in 2011 while showing a declined usage in 2007 and 2010.

IIT Guwahati, one of the youngest among 7 IITs under study, has been recording a consistent increase in the usage of e-resources from 2004 to 2009. Although the usage decreased by 5% in 2010, it has however improved in 2011.

The usage of e-resources at IIT Kanpur shows an increasing trend from 2004 -08 and a decrease in usage during the period 2009-11. IIT Kanpur's total usage of e-resources both in 2011 as well as during 2004-11 is also lower than the IIT Bombay, Khargapur, Delhi and Madras.

Table 1 shows a significant increase in the total usage of e-resources at IIT Kharagpur during 2004-09. IIT Kharagpur was the largest user of e-resources among all IITs in 2009, 2010 and 2011, although its usage for 2010 and 2011 was lower than that of 2009 which has been the highest (1740544 downloads) ever recorded among all IITs.

IIT Madras has recorded the highest total usage of e-resources during 8 years under study. However, the usage has been fluctuating. While the usage increased

Table:1—Downloads of all e-resources at IITs

S. No	Institute	2004	2005	2006	2007	2008	2009	2010	2011	Total
1	IIT Bombay	688419	1031467	921334	1111908	1188166	1366786	1413060	1449922	9171062
2	IIT Delhi	873850	943997	955766	851770	973434	1170458	959507	1031799	7760581
3	IIT Guwahati	75100	160138	228400	350717	443786	476694	451884	482879	2669598
4	IIT Kanpur	296511	675325	766395	913749	1008828	1003190	990734	989732	6644464
5	IIT Kharagpur	516579	692419	843680	1046741	1312923	1740544	1556504	1495662	9205052
6	IIT Madras	524635	1312718	1205759	1381990	1409103	1444460	1390752	1334907	10004324
7	IIT Roorkee	258724	465785	502883	605286	729560	815687	858419	832790	5069134
	Total	3233818	5281849	5424217	6262161	7065800	8017819	7620860	7617691	50524215

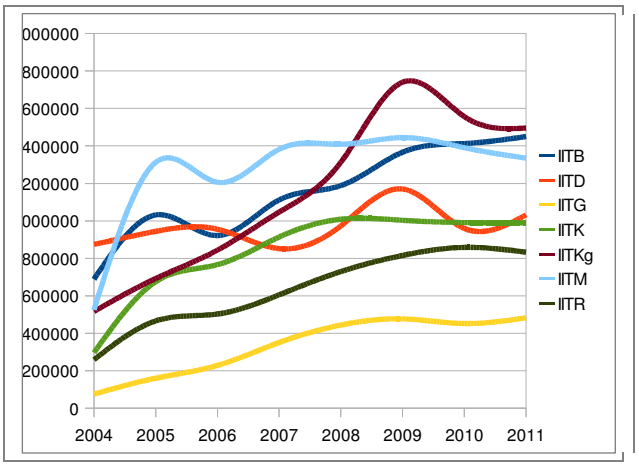

Fig. 1—Trends in Usage of E-Resources at IITs

from 2004 to 2009 except in 2006, the overall usage has been decreasing in 2010 and 2011.

The usage of e-resources at IIT Roorkee has been growing during 2004 -2010 with a marginal decrease in 2011.

Conclusions

IIT libraries spend a significantly large proportion of their budgets to acquire e-resources in response to the increase in their acceptance by academic community. There is a clear shift in the collection development policies of these libraries where e-resources have become a vital part of their core collections.

E-Resources in all IITs have been very well received and are being heavily used as is evidenced from the growth of 135% over a period of 8 years. This supports IIT libraries spending increasingly large portion of their budget for procuring e-resources.

IIT Madras, IIT Kharagpur, and IIT Bombay were found to be the three largest users of e-resources among IITs with an average annual downloads of more than one million records per institute. IIT Delhi's average annual downloads were 0.97 million records.

Most of the heavily used e-resources include Science Direct, Springer Link, SciFinder Scholar, IEEE Explore Digital Library, MathSciNet, APS/AIP Journals, Scopus, Web of Science, ACM Digital Library, and Nature Group Journls. These resources mainly cover engineering, sciences and technology which are the main thrust areas at all IITs.

In some cases the increase in usage has been fluctuating with marginal decline for some resources. IIT libraries must examine on case to case basis all e-resources particularly those with large subscription costs and poor usage over a period of time for their continuity in future after obtaining the feedback from users. If continuation of such e-resources becomes necessary even after poor usage, IIT libraries must take adequate steps and adopt innovative ways to improve the usage of such resources.

IIT libraries which are looked upon by many librarians and libraries in India as their "Role Models, need to continuously work on their strategies not only to improve and sustain the higher usage of e-resources in their collection but also to reach those segments of the users who still remain under-served.

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Annexure – I

Union list of e-resources subscribed by all IITs

Sl. No	E-Resources Publisher/Package	IITB	IITD	IITG	IITK	IIT Kg	IITM	IITR
1	ABI Inform/Proquest Scientific	√	√	X	√	√	√	√
2	ACM Digital Library	√	√	√	√	√	√	√
3	ACS Journals	√	√	√	√	√	√	√
4	AIAA Journals	√	X	X	X	X	√	X
5	AIP/APS/AVS	√	√	√	X	√	X	X
6	AJP Package	X	X	X	√	X	X	X
7	American Waste Mgt Association	√	X	X	X	√	X	X
8	American Ceramic Society	√	X	X	X	√	X	X
9	American Economic Association Journals	√	√	X	X	√	X	X
10	American Geophysical Union	√	√	X	X	√	X	X
11	American Mathematical Society	√	√	√	X	√	√	√
12	AMS Books Online	X	X	√	X	X	X	X
13	American Meteorological Society	√	√	X	X	X	X	X
14	American Society for Microbiology	X	X	X	X	√	X	X
15	American Society Of Agronomy	X	X	X	X	√	X	X

Annexure –I

Union list of e-resources subscribed by all IITs

Sl. No	E-Resources Publisher/Package	IITB	IITD	IITG	IITK	IIT Kg	IITM	IITR
16	American Society Of Plant Biologists	X	X	X	X	√	X	X
17	Annual Reviews	√	√	√	√	√	√	√
18	ASBMB journals	√	X	X	X	X	X	X
19	ASCE Journals	√	√	√	√	√	√	√
20	ASCE Proceedings	√	X	X	X	X	X	X
21	ASME Journals (+AMR)	√	√	√	√	√	√	√
22	ASTM Standards & Digital Library	√	√	√	X	X	√	X
23	Biological Abstract	X	X	X	√	X	X	X
24	BioMed Central (Free in Biology & Medicine	X	X	X	X	X	X	√
25	BioOne Journals	√	X	X	X	X	X	X
26	Biotechnology & World Textiles Abstract	X	√	X	X	X	X	X
27	Bowker's Global Books in Print	X	X	X	√	X	X	X
28	Cambridge University Press	√	√	√	X	√	√	X
29	Capitaline	√	√	X	√	√	√	√
30	Cell Package	√	X	X	√	X	X	X
31	CMIE Database	√	√	X	√	X	X	X
32	Company Law Publishers	X	X	X	X	√	X	X
33	CRIS INFAC Industrial Information	√	√	√	√	√	√	√
34	Crisil Research	√	X	X	X	X	X	X
35	Cumulative Book Index	X	X	X	√	X	X	X
36	ebrary e-Book collection	X	√	X	X	X	X	X
37	EBSCO Database	√	√	X	√	√	√	√
38	EBSCO Textile & Technology Complete	X	√	X	X	X	X	X
39	EBSCO– SOC, Humanities, Psychology.	X	X	√	√	X	X	X
40	EdITLib: Education and Information Technology Digital Library	√	X	X	X	X	X	X
41	EJ Website	X	X	X	X	X	X	√
42	Elsevier's Science Direct	√	√	√	√	√	√	√
43	Emerald Management Extra	√	√	√	√	√	√	√
44	Encyclopedia of science & technology	X	X	X	√	X	X	X
45	Euromonitor (GMID)	√	√	X	√	√	√	√
46	Geological Society Journals	√	X	X	X	X	X	X
47	Geological society of America journals	√	X	X	X	X	X	X
48	Hindwai Publications Under Institutional Membership	√	X	X	X	X	√	X
49	ICE/Thomas Telford Journals	√	√	√	√	√	√	√
50	IAHR Hydrolink Package	√	X	X	√	X	X	X
51	IATUL Package	√	X	X	√	X	X	X
52	ICSD : Inorganic Crystal Structure Database	√	X	X	X	X	X	X
53	IEC Standards	√	√	√	X	X	√	√
54	IEICE Transaction	X	X	X	X	√	X	X
55	Imech E Publications current and Archives (PEP)	√	√	X	√	√	√	√
56	InderScience publisher	√	X	X	X	√	√	X
57	Indian Journals.com	X	X	X	X	X	X	√
58	INFORMS	√	√	X	X	√	X	X
59	INSPEC	√	√	√	√	√	√	√
60	INSIGHT	√	√	√	√	√	√	√
61	Institute of Mathematical Statistics Journals	√	X	X	X	X	X	X
62	Institute of Physics	√	√	X	√	√	X	√
63	ISI Emerging Markets.	X	√	X	X	X	X	X
64	J-Gate (Informatics)	X	X	X	X	X	X	√
65	Japan Inst. Of Metals	X	X	X	X	√	X	X
66	Japan Publication Trading Co	X	X	X	X	√	X	X
67	JCR : Journal Citation Reports	√	√	X	X	X	√	X
68	JoVE : Journal of Visualized Experiments	√	X	X	X	X	X	X
69	JSTOR	√	√	√	√	X	√	√
70	Lecture Notes - Springer Book Series	√	√	√	X	X	X	X

Annexure – I

Union list of e-resources subscribed by all IITs

Sl. No	E-Resources Publisher/Package	IITB	IITD	IITG	IITK	IIT Kg	IITM	IITR
71	Lippincott Williams Wilkins	X	X	X	X	X	√	X
72	Library and Information Science Abstracts	X	X	X	√	X	X	X
73	Maney Publishers	√	X	X	X	√	X	X
74	Materials Sci & Engg (Trans-Tech Publications)	√	X	X	X	√	X	X
75	Mathematics Backfile ?	X	X	√	X	X	X	X
76	MathSciNet	√	√	√	√	√	√	√
77	MIT Press	√	X	X	X	√	X	X
78	Multi-Science Publishing Journals	√	X	X	X	X	X	X
79	MyiLibrary (26 Titles),	X	√	X	X	X	X	X
80	National Geographic	X	X	X	√	X	X	X
81	Nature Group (29 titles)	√	√	√	√	√	√	√
82	Nature Archives 1980-1996	X	√	X	X	X	X	X
83	New Scientist	√	X	X	X	X	X	X
84	NISCAIR Publications	√	X	X	X	X	X	√
85	NOW Publishers package	X	X	X	√	X	X	X
86	NRC Press Journal	√	X	X	X	X	X	X
87	NTRL Database	X	X	X	√	X	X	X
88	OnePetro	X	X	X	X	X	√	X
89	Optics InfoBase (OSA)	√	√	X	X	X	√	√
90	Oxford Dictionary	X	X	√	√	X	X	X
91	Oxford University Press Journals	√	√	X	X	X	√	X
92	Palgrave - Macmillan Journals	√	X	X	X	√	X	X
93	Pion Ltd	X	X	X	X	√	X	X
94	PNAS: Proceedings of the National Academy of Sciences	√	√	√	√	√	√	√
95	POIESIS : Philosophy Online Journals	√	X	X	X	X	X	X
96	Project EUCLID Journals	√	X	X	X	X	X	X
97	Project MUSE Journals	√	√	√	X	X	√	X
98	Proquest Dissertations & Theses A+ B	X	X	X	√	X	X	√
99	Proquest Science (Earlier ASTP) 1994 onwards	X	X	√	X	X	X	√
100	PsycARTICLES	√	X	X	X	X	X	X
101	PV-Tech	√	X	X	X	X	X	X
102	Royal Institute Of Naval Architecture	X	X	X	X	√	X	X
103	Royal Society London	√	X	X	X	√	√	√
104	Royal Society of Chemistry	√	√	X	X	√	√	√
105	Sage Journals	√	√	X	√	√	√	√
106	Science Online	√	√	X	X	√	X	√
107	SciFinder Scholar	√	√	√	√	√	√	√
108	SCOPUS	√	√	√	√	√	√	√
109	Seismological Society of America	√	X	X	X	X	X	X
110	SIAM - Locus(Archives) Journals	√	√	X	√	√	√	√
112	SPIE : Optical Engineering	√	X	X	X	X	X	X
113	Springer Link	√	√	√	√	√	√	√
114	Springer Journal Archives	√	X	√	X	X	X	X
115	Steel and Composite Structures	X	X	X	√	X	X	X
116	Tata McGraw Hill Books	X	X	X	X	X	X	√
117	Taylor & Francis Journals	√	√	√	√	√	√	√
118	Thieme - Chemistry journals	√	X	X	X	X	X	X
119	Thieme Med & Sc Publication	X	X	X	X	√	X	X
120	Thieme – Science of synthesis	√	X	X	X	X	X	X
121	Tissue Engineering A+B+C	X	X	X	√	X	X	X
122	Transportation Research Board	√	X	X	X	X	√	X
123	Ulrich on Disk	X	X	X	√	X	X	X
124	University Of California Press	X	X	X	X	√	X	X
125	University Of Chicago Press	√	X	X	X	√	X	X
126	University Of Illinois Press	X	X	X	X	√	X	X
127	Web of Science	√	√	√	√	√	√	√

Annexure – I

Union list of e-resources subscribed by all IITs

Sl. No	E-Resources Publisher/Package	IITB	IITD	IITG	IITK	IIT Kg	IITM	IITR
128	Wichtig Editore	X	X	X	X	√	X	X
129	Wiley / Blackwell Journals	√	√	X	√	√	√	√
130	World Scientific Journals	√	√	X	X	√	X	X
131	World Textiles	X	√	X	X	X	X	X

Note : X = not available, √ = available